Wheelchair Skill Performance of Manual Wheelchair Users With Spinal Cord Injury

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Many individuals with a spinal cord injury (SCI) rely on their wheelchairs to complete daily mobility tasks. Unfortunately, the natural environment creates many mobility challenges for wheelchair users. A study by Meyers et al found that wheelchair users reported curbs, uneven terrain, and travel surface as barriers to their mobility.[1] To negotiate these mobility tasks, wheelchair users require certain wheelchair skills. A study by Kilkens et al found wheelchair skills performance to be moderately associated with participation.[2] Therefore, the inability to perform certain skills can limit a wheelchair user's functional independence and participation in daily activities. The purpose of this study was to examine wheelchair skill performance of manual wheelchair users with SCI among 6 Model SCI Systems (MSCIS).

Methods

Individuals with traumatic SCI who were at least 1 year post injury, treated at a MSCIS, used a manual wheelchair as their primary means of mobility, and were nonambulatory except for exercise purposes were enrolled in this multisite study. All centers followed the same protocol that was approved by the local institutional review boards at each center before the initiation of study procedures. The participants completed a self-report questionnaire that captured demographic information such as age, sex, race, level of injury, and duration of injury. In addition, the Wheelchair Skills Test (WST) (version 4.1) for manual wheelchair users was administered to each participant.[3] WST 4.1 is a standardized method of evaluating a wheelchair user's ability to safely and effectively complete 32 skills of varying levels of difficulty. Data collectors recorded a pass, fail, or no part score for each skill. The WST has been found to be a reliable tool to measure the performance of wheelchair skills.[4] Examples of skills included propelling 100 m, getting through a hinged doorway, getting over a 2 cm threshold, ascending and descending 5° and 10° ramps, ascending and descending 5 cm and 15 cm curbs, and performing a stationary wheelie for 30 s. Prior to administering the WST, all data collectors received training and certification to ensure data were collected in a uniform manner. Descriptive statistics (mean and *SD* for continuous data and frequency for categorical data) were calculated for demographic and WST data.

Results

Of the 212 participants (168 male, 44 female), 154 had paraplegia, 56 tetraplegia, and the level of injury was unknown in 2. The mean ± *SD* age of participants was 38.8 ± 12.2 years and time post injury was 11.1 ± 10.6 years. A majority of the manual wheelchair users were unable to complete the community and advanced level WST skills. Over 70% of participants were unable to ascend

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and 50% were unable to descend a 15-cm curb. In addition, 39% of participants were unable to maintain a stationary wheelie position for 30 s. Over 40% of participants also had difficulty getting from the ground to their wheelchair, ascending and descending stairs, and turning 180° in a wheelie position.

Discussion

Although wheelchair skills are important for enabling manual wheelchair users to safely and effectively negotiate mobility tasks that they encounter in their natural environments, many of the manual wheelchair users with SCI whom we studied had difficulty performing community and advanced level skills. Approximately 40% of participants were unable to maintain a stationary wheelie for 30 s. The wheelie is an important skill for manual wheelchair users, because it is essential in performing many other tasks such as ascending and descending curbs, steep inclines, and potholes.[5] There are a number of factors why the participants were unable to complete many of the wheelchair skills. One of the reasons may be that manual wheelchair users are not receiving adequate training during their rehabilitation. For individuals with SCI, the length of rehabilitation stay has been decreasing over the past 30 years.[6] Therefore, due to the reduced length of time in rehabilitation, individuals with SCI are only learning basic mobility skills. Another reason may be that the type of wheelchair they are using is not appropriate for them or has not been properly fitted and adjusted. Future research is needed to improve our understanding of the factors related to the ability to complete community and advanced level wheelchair skills. These findings also suggest that additional wheelchair skills training may be advantageous.

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